Problem E. Yet Another Problem About Permutations

Input file:	`permutation.in`
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	256 mebibytes

This is a problem about permutations. If you are not familiar with some of the terms used below, please see the note following the example.

A permutation p is said to be *simple* if the length of each of its cycles does not exceed two. For example, permutation $2, 1, 4, 3$ is *simple*, but permutation $3, 1, 2$ is not.

You are given a permutation p. Your task is to represent it as a product of minimal number of simple permutations.

Input

The first line of input contains one integer T, the number of test cases ($1 \le T \le 10^5$). The test cases follow.

Each of next T lines describes a single test case. Each test case description consists of an integer n, the length of the permutation p ($1 \le n \le 10^5$), followed by n distinct integers $p_1, p_2, \ldots, p_n$, the permutation p itself ($1 \le p_i \le n$, each number from 1 to n appears in the permutation exactly once).

The total length of all permutations in the input is not greater than 10^6.

Output

For each test case, start by printing a line containing an integer k, the minimal number of simple permutations in the product. The next k lines must describe simple permutations $q^{(1)}$, $q^{(2)}$, …, $q^{(k)}$, one per line. On i-th of these lines, print n distinct integers from 1 to n describing permutation $q^{(i)}$. The product $q^{(1)} \circ q^{(2)} \circ \ldots \circ q^{(k)}$ must be equal to p.

If there are several optimal answers, print any one of them.

Example

permutation.in	standard output
2 4 2 1 4 3 3 3 1 2	1 2 1 4 3 2 3 2 1 1 3 2

Note

A *permutation* of length n is a sequence of n integers where each integer from 1 to n appears exactly once.

A *cycle* in a permutation p is a sequence $i_1, i_2, \ldots, i_t$ of distinct integers from 1 to n such that $p_{i_1} = i_2$, $p_{i_2} = i_3$, …, $p_{i_{t-1}} = i_t$ and $p_{i_t} = i_1$. The number $t \ge 1$ is called the *length* of the cycle.

The *product* $a \circ b$ of two permutations a and b is a permutation c such that for each i, $c_i = a_{b_i}$. For example, if $a = 3\,2\,1$ and $b = 1\,3\,2$, their product is $a \circ b = 3\,1\,2$.

The *product* of three or more permutations can be evaluated in any order, for example, $a \circ b \circ c = (a \circ b) \circ c = a \circ (b \circ c)$.